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CHEMISTRY.—*The element "mosandrum" of J. Lawrence Smith.*[1]

ROGER C. WELLS, U. S. Geological Survey.

Before the discovery of the rare earth element illinium by Hopkins[2] American chemists sometimes lamented the fact that no elements had been discovered in this country. It is true that Hillebrand had collected helium from uraninite but he did not recognize it as a new element. A few claims had been made but not substantiated. On the other hand, it is well known that J. Lawrence Smith definitely claimed the discovery of a new element in samarskite, which he called "mosandrum," but the fact that this name is not in the present list of elements tacitly suggests to most people that Smith did not find a new element. As a matter of fact he undoubtedly had at least one new element, perhaps three, in a certain fraction of "cerium earths," but his name "mosandrum" failed to hold for any of these elements on account of a peculiar combination of circumstances. Too many chemists were claiming new elements at that particular period and in the mix-up of conflicting claims Smith, Delafontaine and Soret "lost out," though each was dealing with material containing new elements, as shown by subsequent developments.

Smith's well known method for determining the alkalies is a good one but the method he used for analyzing samarskite, a mineral containing a great variety of elements, has since been found to be incomplete and to yield imperfect separations of some of the constituents. For example, calcium and lead were apparently not found by him. As he was one of the first to study the rare earths of samarskite his prepa-

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[2] Ind. Eng. Chem., News edition, Mar. 20, 1926; Jour. Franklin Inst. 204: 1. 1927.

rations containing a supposed new earth were naturally less pure than those made by later investigators.

In spite of the shortcomings just mentioned reasons can be advanced for giving Smith credit for the discovery of samarium, and probably also of gadolinium and possibly europium. Working on earths obtained from samarskite in 1877 he modestly claimed the discovery of only one new element, which he shortly afterwards named mosandrum. It should be recalled that the only elements of the rare earth group recognized in 1877 were yttrium, cerium, lanthanum, didymium, erbium and terbium. But about the same time Delafontaine thought that he had found a new earth in "yttria," the element of which he named philippium, and another in "didymia," whose element he named decipium, so that when he and Marignac hesitated to recognize "mosandrum," the weight of their authority and the uncertainties of the questions involved left the identity of "mosandrum" in doubt.

Smith sent a communication to the French Academy[3] in September, 1877, (which was, however, not read until the next July) in which he stated that the "cerium earths" extracted from samarskite contained an earth (about 3 per cent of the mineral) which he regarded as new, if it was not terbium, which Delafontaine thought it might be. Its molecular weight was 327. It was more soluble in dilute nitric acid than ceria, also in an alkaline solution through which chlorine is passed. It differed from didymia in color and in the fact that its solutions showed no absorption spectrum, and from lanthana in color and in the great ease with which its salts are decomposed by heat.

Shortly afterwards he proposed the name mosandrum for the new element.

In the light of present knowledge the element thus claimed by Smith could only be samarium, europium or gadolinium, as Smith was not considering the yttrium group. Let us see what happened in the next few years. Smith generously distributed samples of the earths extracted from samarskite to several American and French chemists for any further studies they might wish to make.

Delafontaine and Marignac criticised Smith's announcement of a new element adversely,[4] but it must be remembered that they were at that time strenuously engaged in establishing their own claims to the discovery of new elements.[5]

[3] Acad. sci. C. R. **87**: 146. 1878.

[4] DELAFONTAINE, Acad. sci. C. R. **87**: 600. 1878; MARIGNAC, *idem*. **87**: 281. 1878.

[5] DELAFONTAINE, Arch. sci. phys. nat. **61**: 273. 1878; Acad. sci. C. R. **87**: 559. 1878; MARIGNAC, Arch. sci. phys. nat. **64**: 97. 1878; Acad. sci. C. R. **87**: 578. 1878.

In the years intervening between 1878 and 1886 Lecoq de Boisbaudran, through fractionations, accompanied by spectroscopic study, of earths associated with "didymia," found, characterized and named samarium[6] (from the mineral samarskite). He said, "I think I should state here that the recognition of the new metal is the fruit of the independent researches of several persons. To each should eventually be attributed his just share in the discovery." These "unnamed persons" were J. Lawrence Smith, Delafontaine, Soret, and Marignac. The name mosandrum might have been applied to the element that was designated samarium, although Lecoq de Boisbaudran made no mention of Smith's element at the time he proposed the name samarium.

In the same period Marignac isolated the oxide of a metal, Y_α, that he supposed might be the element claimed by Smith.[7] His methods included fractional decomposition of the nitrates by heat and fractional precipitation of the sulphates by potassium sulphate. Smith had also used these methods but Marignac repeated the operations many times and, as Crookes showed by means of a characteristic phosphorescent spectrum, his product, Y_α, was pure, whereas that of Smith was impure. The same fraction containing Y_α was also prepared by Crookes. The element Y_α was later named gadolinium.[8] It might possibly also have been considered to be mosandrum.

Finally, in 1886, some material that had been prepared by Smith in Louisville several years before was examined by Lecoq de Boisbaudran,[9] who actually found in it, after removing didymium, both samarium and gadolinium, with some terbium, thus substantiating in a remarkable way Smith's original claim of a new element in samarskite.

Europium was not characterized until afterwards but may have been present as part of the "samarium." It is not easy to say who really discovered europium.

It must be admitted that Smith recognized a new earth in samarskite, but he did not obtain it in a pure state. For that matter, however, the first preparations of yttria, ceria, didymia, terbia, erbia, ytterbia, samaria, and holmia were all later shown to be impure, although they were credited to their discoverers as new.

[6] LECOQ DE BOISBAUDRAN, Acad. sci. C. R. **88**: 322; **89**: 212. 1879.

[7] MARIGNAC, Acad. sci. C. R. **90**: 899. 1880; *idem*, **102**: 646. 1886; CROOKES, *idem.*, **102**: 646. 1886.

[8] LECOQ DE BOISBAUDRAN, Acad. sci. C. R. **102**: 902. 1886.

[9] LECOQ DE BOISBAUDRAN, Acad. sci. C. R. **102**: 647. 1886.

It required the spectroscopic work of Lecoq de Boisbaudran to isolate samarium, and he is generally recognized as its discoverer in spite of his credit to several other unnamed persons. On the other hand, the spectroscopic work of Crookes established the identity of gadolinium but its discovery is generally credited to Marignac. Smith and Crookes should share to some extent in that honor.

Marignac on several occasions insisted that Smith's element could not be either of those claimed as new by himself or Delafontaine (philippium, decipium, and Y_α), because its oxide was supposed to be yellow. But Smith did not say that his new earth was yellow; moreover, he says that its salts show no absorption spectrum. One cannot help feeling that Marignac's insistence that Smith's earth was yellow had more weight than it should have had in discrediting Smith's real discovery. Smith may have realized that color is a deceptive guide, as small quantities of foreign oxides show strongly in the colorless earths. On the other hand, it was only after Soret's spectroscopic study that Smith had sufficient confidence to advance the definite name mosandrum for the element he claimed as new.

When all the facts are considered, it appears that J. Lawrence Smith should be given credit for recognizing the existence of a new element in samarskite, although his own preparations were impure and his characterization of the element was indefinite. The element he named "mosandrum" was in fact not one but at least two elements later given the new names samarium and gadolinium.

MINERALOGY—*Sericite-lazulite pseudomorphs after orthoclase from Bolivia.*[1] EARL V. SHANNON, U. S. National Museum.

The following description pertains to some very interesting specimens in the collection of the late Frederick A. Canfield of Dover, N. J., which is now in the National Museum. The specimens were collected personally by Mr. Canfield in 1886 while he was in charge of the mines of the Royal Silver Mines of Bolivia, Limited. There are several examples of the material in the collection (Original Numbers 1650, 5138, 5140) and others were contained in the duplicate material from the Canfield collection purchased from the estate by the Mineralogical Museum of Harvard University.

The specimens bear the label "Turquois? ps. after orthoclase in

[1] Published by permission of the Acting Secretary of the Smithsonian Institution. Received August 2, 1927.

porphyry, Real Socavon, Potosi, Bolivia," and an additional memorandum on one of the labels states that "these crystals have never had a complete analysis. The late L. C. Bierwirth found that they were a phosphate of alumina." The crystals in question consist of pale to deep turquoise-blue pseudomorphs after orthoclase phenocrysts sparsely scattered through a highly altered quartz porphyry. The groundmass is a pale buff mass of sericitic material containing scattered minute crystals of pyrite. The original embayed crystals of quartz are unchanged and the porphyritic structure of the rock is perfectly retained. The larger orthoclase phenocrysts are now entirely composed of the turquoise-blue material. These are either simple crystals or Carlsbad penetration twins. They are thick tabular parallel to the (010) pinacoid and are somewhat longer than broad reaching extreme dimensions of 33 × 22 × 7 mm. The crystal habit is usual, the only forms represented being the pinacoid $b(010)$, the prism $m(110)$, the base $c(001)$, and the back dome $y(\bar{2}01)$. Coming, as they do, from the walls of a tin vein, these are strongly reminiscent of the perfect Carlsbad twin pseudomorphs of cassiterite after orthoclase, from the walls of tin veins in Cornwall, which are to be found in old collections.

The feldspar phenocrysts of intermediate size are not twinned and range in constitution from those consisting of an outer crust of blue material surrounding a core of sericite, often stained brown by iron, to masses of soft white sericite including only a grain or two of blue substance. The smaller phenocrysts, probably originally plagioclase, are now silky white sericite without any of the blue material.

Several of the broken or imperfect pseudomorphs were detached from the matrix for study. When these were crushed they were found to contain small perfect euhedral crystals of arsenopyrite, pyrite and quartz in a soft and lustreless blue groundmass. The whole mass was ground and screened and the quartz and sulphides separated with methylene iodide-bromoform heavy solutions. The blue material was further separated into heavier and lighter fractions. It was hoped that the blue mineral could be isolated for analysis by this method, but microscopic examination of the best concentrates which could be prepared indicated this to be impracticable. The purified material consisted of scattered blue grains in an abundant matrix of aggregated grains of sericite. Mechanical separation proved impossible and neither blue mineral nor matrix were attacked by boiling 1:1 hydrochloric acid. When the material was fused with sodium carbonate and dissolved in nitric acid, the solution reacted strongly for phosphoric

acid with ammonium molybdate reagent. When ignited it turned brown, and when the brown material was digested in acid the solution contained aluminum but gave no reaction for copper.

Under the microscope the determination of the optical properties is difficult owing to the small size of the grains of the blue material, their aggregate character, and the confusion with the intergrown sericite. Determination of the refractive indices is especially difficult but the mean index, β, is about 1.654. The birefringence is moderately low and the grains perpendicular to an optic axis do not extinguish in white light but owing to the high dispersion give abnormal blue and liver-brown colors. The mineral is biaxial and negative, with 2V very small. The dispersion, $r<v$, is very strong. There is a suggestion of imperfect cleavage in one direction and the grains are distinctly pleochroic with X colorless, Y and Z blue. These optical properties differ from those given by Larsen for lazulite in that the indices are higher and the axial angle is smaller. The mineral agrees with lazulite in dispersion, optical sign, and pleochroism. The optical properties other than sign agree more nearly with turquoise but that mineral is optically positive. This difference and the fact that no copper could be detected support the identification of the blue phosphate as lazulite. The higher indices and smaller axial angle are doubtless traceable to difference in composition between this Bolivian material and the ordinary Georgia lazulite upon which the data in Larsen's tables are based.

The possibility that the mineral is an abnormally biaxial manganapatite was considered but rejected. After long boiling with 1:1 nitric acid the blue material was not dissolved, and the extract gave a barely perceptible manganese color with ammonium persulphate. The extract reacted for phosphoric acid but this is doubtless due to a small amount of apatite of ordinary character which occurs as minute grains and prisms scattered through the sericitic material.

PALEONTOLOGY.—*A new early Ordovician sponge fauna.*[1] R. S. BASSLER, U. S. National Museum.

Although a few individual species are found sometimes in great numbers, Paleozoic sponges are comparatively rare. The discovery of an entirely new fauna comprising two families, one of them represented by five new genera, is therefore of unusual interest. This exceptional

[1] Received July 25, 1927.

assemblage of new sponges was discovered in early Ordovician rocks of Chazyan age by Messrs. H. G. Clinton and Percy Train of Manhattan, Nevada, two enthusiastic students of the geology of this state, who transmitted the specimens to me for determination and presented a generous set to the U. S. National Museum upon condition that they be described. The exact locality of these new sponges is in McMonnigal Canyon, about 10 miles west of the Devil's Punch Bowl in Monitor Valley and about 60 miles north of Manhattan, Nevada. According to Mr. Train, the limestones outcropping here are several thousand feet thick and form the main backbone of the Monitor Range on the west side of the valley. All the new sponges occur near the valley floor in the lower few hundred feet of the series.

The specimens are found in somewhat shaly limestone, often attached to thin fossiliferous layers containing brachiopods, trilobites, and other invertebrates of decided Chazyan aspect. Among the various forms of trilobites noted, several are new species of exceptional interest, and one occurs abundantly which upon close study cannot be distinguished from *Pliomerops barrandei* Billings, originally described from the Chazyan of Newfoundland. Curiously enough, most of the sponges belong to the family Archaeoscyphidae, hitherto represented only in strata in the easternmost portion of North America.

As Messrs. Clinton and Train have a considerable number of these new sponges which they wish to send out to students, they have asked me to issue this preliminary note in advance of a more detailed, illustrated article so that they may have names for their specimens. All of their specimens can be classified under two Early Paleozoic families: first, the Anthaspidellidae Ulrich and Everett, represented by *Anthaspidella* and *Streptosolen;* and second, the Archaeoscyphidae Rauff, hitherto known from a single genus and species but now augmented by five new genera. The following brief descriptions give the general features of these new forms.

SILICISPONGIAE

Order TETRACTINELLIDA

Family ARCHAEOSCYPHIDAE Rauff

Sponge attached, simple or branching, ranging from saucer and funnel shapes to turbinate and frondescent; simple or branched cloaca usually of considerable diameter; oscula represented by numerous, closely spaced, small pores penetrating the spicular tissue of the wall and opening on the outer surface at regular intervals. Spicular structure much as in the Anthaspidellidae.

Genus **Nevadocoelia**, n. gen.

Simple, erect, obconical, pedunculate sponges pierced throughout their length by a wide cloaca and marked on their outer surface by transverse ridges or rows of nodes.

Genotype.—Nevadocoelia wistae, n. sp.

Nevadocoelia wistae, n. sp.

Sponge elongate, as much as 12 centimeters in length and 4 centimeters in greatest width, tapering gradually towards the base, with the surface marked by undulating, more or less parallel transverse ridges, of which 7 occur in 3 centimeters.

The specific name is in honor of Miss Meta Wist of Manhattan, Nevada, in appreciation of her interest in the natural history of that state.

Nevadocoelia traini, n. sp.

Similar in growth to the preceding but with the surface marked by sharp nodes instead of transverse ridges. These nodes are arranged in somewhat irregular transverse rows and six of them occur on an average in 2 centimeters, measuring transversely.

Nevadocoelia grandis, n. sp.

Sponge not unlike *N. wistae* in structure but much larger. The diameter is 7.5 centimeters and the ridges stronger, with only 3.5 in 3 centimeters.

Nevadocoelia pulchra, n. sp.

Sponge 7 centimeters in diameter and more than 11 centimeters high with the cloaca 2 or more centimeters wide; marked by unusually large surface ridges which form wide, ascending, flange-like expansions and measure at least 1.5 centimeters distant from each other.

Genus **Lissocoelia**, n. gen.

Sponge consisting of smooth, cylindrical, hollow stems, branching at irregular intervals. Surface minutely porous and with the general structure of the family. Cloaca narrow but extending the full length of the sponge.

Genotype and only species.—Lissocoelia ramosa, n. sp.

Lissocoelia ramosa, n. sp.

Sponge smooth, branching, usually about 1.5 centimeters in diameter but increasing to 2 centimeters at a division point; the cloaca 0.5 centimeters wide. Surface smooth, marked by small rounded pores distributed equally throughout the spicular tissue.

Genus **Calycocoelia**, n. gen.

Sponge cup-shaped with the cloaca increasing in width from below upward and opening at the upper outer surface as a deep excavation. Surface smooth and exhibiting the general microscopic structure of the family.

Genotype and only species.—Calycocoelia typicalis n. sp.

Calycocoelia typicalis, n. sp.

The cup-shaped form, smooth surface, and wide cloaca of this species, 7 centimeters in diameter at the top and less than 4 near the base, characterize this interesting species.

Genus **Patellispongia**, n. gen.

Sponge as found in the rocks consisting of lamellar fragments, sometimes of considerable dimensions, but originally probably broad saucer-shaped expansions attached by a short stem. Under surface comparatively smooth, covered by a thick dermal tissue which when weathered shows regular canals or channels. Upper surface with numerous evenly spaced rounded pores surrounded by the usual spicular tissue.

Genotype.—Patellispongia oculata, n. sp.

Patellispongia oculata, n. sp.

This species forms broad lamellar expansions with the upper surface exhibiting numerous rather regularly spaced pores 1 millimeter in diameter with 6 to 7 in 10 millimeters.

Patellispongia clintoni, n. sp.

Sponge similar to the preceding in growth but the pores slightly larger and, more important from a specific standpoint, almost 5 millimeters apart.

Patellispongia minutipora, n. sp.

Sponge consisting of thin lamellae and differing particularly from other members of the genus in the minuteness of the pores, since at least 15 can be counted in 10 millimeters.

Genus **Hesperocoelia**, n. gen.

General structure similar to that of *Patellispongia* save that the broad saucer-shaped lamella of that genus is here represented by a flat, undulated, two-leaved frond pierced along the upper edge by a row of rounded or oval openings which constitute the cloaca.

Genotype.—Hesperocoelia typicalis n. sp.

Hesperocoelia typicalis, n. sp.

Sponge a flattened, flabellate frond more than 5 centimeters high and about 6 millimeters in thickness, traversed by longitudinal canals of varying diameter which emerge at the surface along the upper thin edge in a row of narrow openings, each about 3 millimeters long, spaced so that 5 occur in 20 millimeters. The usual pores in the spicular tissue show on both sides of the sponge with an average of 4 pores in 3 millimeters, measuring longitudinally.

Hesperocoelia undulata, n. sp.

This species differs decidedly from the preceding in that the openings along the upper edge of the sponge are round, 4 millimeters in diameter with about 3.5 in 20 millimeters. Moreover, the small pores penetrating the spicular tissue are more delicate and closely spaced.

Family ANTHASPIDELLIDAE Ulrich and Everett.

Genus ANTHASPIDELLA Ulrich and Everett.

This fine genus is represented by two very distinct new species which I have the pleasure of naming in honor of the discoverers of this new fauna.

Anthaspidella clintoni, n. sp.

Although related to *Anthaspidella scutula* Ulrich and Everett from the Black River (Platteville) limestone at Dixon, Illinois, in that it has the clusters consisting of the oscula and radiating canals comparatively small and close together, the present species differs in that the clusters measure 15 millimeters, on an average, from center to center.

Anthaspidella traini, n. sp.

Sponge suggesting *Anthaspidella florifera* Ulrich and Everett, from the Black River limestone at Dixon, Illinois, but differing in that the clusters are farther apart, averaging 25 millimeters from center to center.

Genus STREPTOSOLEN Ulrich and Everett.

Streptosolen occidentalis, n. sp.

Sponge with the form and general structure of *Streptosolen obconicus* Ulrich and Everett, the genotype, from the Black River (Platteville) limestone at Dixon, Illinois, but differing in that the canals do not intertwine so much and the central osculum is much wider and has larger tubes.

BOTANY.—*The genus* Hampea.[1] PAUL C. STANDLEY, U. S. National Museum.

The genus *Hampea* consists of a small group of American trees and shrubs which has been referred by most authors to the family Bombacaceae, although others have believed its more natural position to be in the Malvaceae. The genus was based by Schlechtendal upon a single species, *H. integerrima*, described from Veracruz. In 1862 Triana and Planchon described a second species, *H. thespesioides*, from Colombia, and in 1886 Sereno Watson a third from Guatemala. A variety of *H. integerrima* was described from Costa Rica in 1899 by Capt. John Donnell Smith, and in 1923 I transferred to the genus a Mexican plant described as a *Thespesia* by Presl, and published a new species from the Yucatán Peninsula.

Practically all the scanty herbarium material of the genus has been referred without question to the original *H. integerrima*. Our representation of the genus has increased rapidly in recent years, and when an attempt was made recently to name two Central American specimens, it became evident that the group was badly in need of revision.

In the present treatment nine species are recognized, one indigenous in Colombia, the others ranging from Panama to southern Mexico.

Through the courtesy of Dr. B. L. Robinson the material of this genus in the Gray Herbarium has been lent for study by the writer.

[1] Published by permission of the Secretary of the Smithsonian Institution. Received July 7, 1927.

HAMPEA Schlecht. Linnaea 11: 371. 1837.

Key to the Species

Leaf blades with small auriculiform appendages at base. Leaves entire; capsule glabrous within except along the sutures; calyx in bud closed, in anthesis irregularly lobed.
Appendages of the leaf blade 5 mm. long; capsule 2–2.3 cm. long; seeds 8 mm. long..... **1. H. appendiculata.**
Appendages 2 mm. long; capsule 1.5–1.7 cm. long; seeds 5 mm. long. **2. H. panamensis.**

Leaf blades not appendaged at base.
Leaves glabrous beneath or essentially so.
Leaves entire; calyx truncate, not closed except in very young buds, 5–7 mm. long. Capsule densely hispid within. **3. H. integerrima.**
Leaves 3-angulate; calyx closed in bud until shortly before anthesis, irregularly lobate, 10 mm. long..... **4. H. Rovirosae.**
Leaves obviously stellate-tomentose beneath. Capsule glabrous within except along the sutures.
Leaves cordate at base, angulate or lobate.
Pedicels solitary; leaves 5 or 7-nerved at base... **5. H. thespesioides.**
Pedicels in dense clusters in the leaf axils; leaves 9-nerved. **6. H. platanifolia.**
Leaves truncate or rounded at base or merely concave, not cordate.
Capsules 2.5–3 cm. long. Leaves entire. **7. H. tomentosa.**
Capsules 1–1.8 cm. long.
Leaves entire, usually abruptly acuminate, sparsely and minutely stellate-pubescent beneath; pedicels in anthesis 1.4 cm. long or shorter..... **8. H. stipitata.**
Leaves mostly angulate or shallowly lobate, rounded to acute at base, densely and coarsely stellate-tomentose beneath (in age sometimes glabrate); pedicels in anthesis mostly 2–3.8 cm. long..... **9. H. trilobata.**

1. Hampea appendiculata (Donn. Smith) Standl.

Hampea integerrima var. *appendiculata* Donn. Smith, Bot. Gaz. **27**: 331. 1899.

Although described originally as a variety, it is evident that this Costa Rican plant is worthy of specific rank. It differs from *H. integerrima* in its appendaged leaves; lobed, not truncate calyx; and in the glabrous rather than hispid inner surface of the capsule. The following specimens are at hand:

Costa Rica: La Palma, alt. 1,550 m., *Tonduz* 12462 (*J. D. Smith* 7379; type). La Hondura, Prov. San José, alt. 1,300 m., *Standley* 37627, 36141. Tilarán, Guanacaste, alt. 600 m., *Standley & Valerio* 44401. Platanares (Moravia), *Rowlee & Jiménez* 208. El Muñeco, Prov. Cartago, alt. 1,400 m., *Standley & Torres* 50941. Los Ayotes, Guanacaste, alt. 600 m., *Standley & Valerio* 45458. Naranjos Agrios, Guanacaste, alt. 600 m., *Standley & Valerio* 46427. La Tejona, Guanacaste, alt. 600 m., *Standley & Valerio* 45922.

This species is usually a small tree, 5 to 25 meters in height. It is common in the wet forests of central Costa Rica and of the Province of Guanacaste. The local name is "buriogre."

2. **Hampea panamensis** Standl., sp. nov.

Medium-sized tree, the trunk sometimes 60 cm. in diameter; young branches densely stellate-tomentose, the tomentum minute, ferruginous or ochraceous; petioles slender, 3.5–6.5 cm. long, stellate-tomentose; leaf blades ovate or broadly ovate, 9–22 cm. long, 5–12 cm. wide, entire or slightly undulate, abruptly acuminate or merely acute, at base truncate or rounded and often asymmetric, auriculate-appendaged at the insertion of the petiole, the appendages rounded, 2 mm. long; blades membranaceous, deep green on the upper surface, when young sparsely and very minutely stellate-puberulent but in age glabrous or nearly so, beneath paler, covered with a minute, appressed, rather dense stellate tomentum of fulvous hairs, 5-nerved at base; flowers numerous, fasciculate in the leaf axils, the pedicels 5.9 mm. long, stellate-tomentose; bractlets 3, narrowly triangular or subulate, 2–2.5 mm. long, appressed to the calyx, caducous; calyx in bud closed, globose, in anthesis campanulate, 6 mm. long, minutely tomentose, shallowly and irregularly 3-lobate, the lobes rounded; petals spreading or reflexed, 1 cm. long, densely and very minutely tomentose outside, glabrous within, gland-dotted; capsule obovoid-globose, short-stipitate, 1.5–1.7 cm. long, rounded at apex, verruculose and brown-tomentose, 3-valvate, within hispid along the sutures but elsewhere glabrous; seeds 2 in each cell, oval, 5 mm. long, blackish brown, lustrous, the aril caplike, covering less than half of the seed; pedicels in fruit slender, about 2 cm. long, the calyx persistent.

Type in the U. S. National Herbarium, no. 1,269,804, collected in the Almirante region, Province of Bocas del Toro, Panama, in 1927, by G. P. Cooper and G. M. Slater (no. 15). The following collections also belong here:

PANAMA: Almirante region, *Cooper & Slater* 8. Changuinola Valley, *V. C. Dunlap* 227.

The vernacular names are given as "burío" and "azote." The wood is described as creamy gray and of medium coarse texture.

Hampea panamensis is closely related only to *H. appendiculata*, which has rather narrower leaves with much larger appendages, and with a denser tomentum on the lower surface, and larger capsules and seeds.

3. **Hampea integerrima** Schlecht. Linnaea **11**: 372. 1837.

This is the type of the genus. The original material was collected near Josocola and Hacienda de la Laguna, Veracruz, by Schiede. The plant is very uniform in foliage, flower, and fruit characters. The following specimens have been examined:

VERACRUZ: Zacuapan, *Purpus* 4453, 4453a, 8030 (Gray Hb.), 10748. Orizaba, *Botteri* in 1856; *Bourgeau* 3116 (Gray Hb.). Mirador, *Liebmann* 393. Misantla, *Purpus* 5925. Jalapa, *C. L. Smith* 1536 (Gray Hb.).

OAXACA: Colonia Melchor Ocampo, *Conzatti* 173 (Gray Hb.).

Known in Veracruz as "jonote blanco."

4. **Hampea Rovirosae** Standl., sp. nov.

Young branchlets very sparsely and minutely stellate-puberulent, soon glabrous or nearly so; petioles slender, 3.5–16 cm. long, glabrate; leaf blades

rounded-ovate to suborbicular, 8–17 cm. long, 7–16 cm. wide, abruptly short-acuminate to obtuse, at base truncate or subcordate, the smaller leaves entire, the larger angulately 3-lobate, membranaceous, deep green above, glabrous or nearly so, beneath slightly paler, with a few minute stellate hairs scattered along the nerves, elsewhere glabrous, 7-nerved at base; flowers fasciculate in the leaf axils, the pedicels stout, 5–15 mm. long, minutely and sparsely stellate-puberulent; bractlets filiform, 3 mm. long; calyx ovoid in bud, in anthesis irregularly and shallowly cleft, campanulate, 1 cm. long, minutely stellate-tomentose or glabrate; petals reflexed, nearly 2 cm. in total length, broadly rounded at apex, minutely stellate-tomentose on the outer surface, glabrous or nearly so on the inner surface.

Type in the U. S. National Herbarium, no. 943,425, collected on moist banks of the Río Grijalva, Tabasco, Mexico, August 19, 1889, by J. N. Rovirosa (no. 586). Vernacular name, "majagua blanca."

Hampea Rovirosae is closely related to *H. integerrima* and may be only a form of that species. It differs from the latter in the broader, sometimes angulate leaves, and in the larger, irregularly lobed calyx.

5. **Hampea thespesioides** Triana & Planch. Ann. Sci. Nat. Bot. IV. **17:** 188. 1862.

No material has been seen of this species, the only one occurring outside Central America and Mexico. It is reported, in the original publication, from the following localities:

COLOMBIA: Forests of the Province of Antioquía, alt. 700 m., *Triana.* Between Las Ceibas and Honda, and between El Peñón and Quebrada Grande, *Goudot.* Near Muzo, *Purdie.*

The vernacular names are "zapotillo" and "achote cimarrón."

Judging from the description, *H. thespesioides* is related to the following Costa Rican species. The authors give no dimensions of the parts of the plant, and detailed comparison is therefore difficult.

6. **Hampea platanifolia** Standl., sp. nov.

Large shrub or small tree, with few branches, the young branchlets densely and coarsely stellate-tomentose with brownish pubescence; petioles stout, 16–27 cm. long, stellate-tomentose; leaf blades rounded-cordate in outline, 18–30 cm. long and usually of equal or greater breadth, rounded to cuspidate-acuminate at apex, at base shallowly or usually deeply cordate, the sinus narrow or broad, 3–7 cm. deep, the blades angulately 3 or 5-lobed, the lobes broadly rounded or obtuse, often cuspidate, membranaceous, deep green on the upper surface, when young densely stellate-tomentose, the tomentum persistent along the nerves, rough to the touch, beneath paler, at first densely and rather coarsely stellate-tomentose with fulvous hairs, the tomentum in age sparser but copious, the blades 9-nerved at base; flowers numerous, densely clustered in the leaf axils, the pedicels stout, 8 mm. long or shorter, coarsely stellate-tomentose; bractlets linear or filiform, 4–6 mm. long, deciduous; fully developed flowers not seen; calyx at first closed, but expanding before anthesis, broadly campanulate, 5 mm. long and 7 mm. broad, densely and minutely tomentose, subtruncate and remotely repand-dentate, the 5

teeth short, narrowly triangular; corolla in bud densely and minutely stellate-tomentose outside; pedicels in fruit stout, 2–3 cm. long; capsule densely and coarsely stellate-tomentose with yellowish tomentum, short-stipitate, 3-valvate, the valves 3.5–4.5 cm. long, 13–15 mm. wide, glabrous within except along the sutures, there hispid, the cells apparently about 5-seeded.

Type in the U. S. National Herbarium, no. 938,656, collected in forest near El Copey, Province of San José, Costa Rica, altitude 1,800 meters, February, 1898, by A. Tonduz (no. 11667). Three other sheets of the same collection are in the National Herbarium.

Collected also at Capulín, on the Río Grande de Tárcoles, Province of Alajuela, Costa Rica, altitude 80 meters, April 2, 1924, *Standley* 40177.

It is unusual in Costa Rica to find a species which grows at so great an elevation as 1,800 meters occurring at sea level, but it is probable that seeds have been transported downstream from the mountains to Capulín, where I found the plant growing.

Hampea platanifolia is very unlike the other Central American species in its large, broad, long-petiolate leaves. It appears to be related to *H. thespesioides*, although the description of the latter species is deficient in some important details. Only open capsules of the Costa Rican plant are available. Their long narrow valves indicate that the fruit must be very narrow in outline, and decidedly different from the globose capsule found in other species.

7. **Hampea tomentosa** (Presl) Standl. Contr. U. S. Nat. Herb. **23**: 787. 1923.

Thespesia tomentosa Presl, Rel. Haenk. **2**: 136. 1836.

The type was collected by Haenke in western Mexico. The following collections are in the National Herbarium:

OAXACA: Cafetal San Rafael, Distrito de Pochutla, alt. 800 m., *Conzatti, Reko & Makrinius* 3292. Cafetal Montecristo, alt. 800 m., *Reko* 3428.

SALVADOR: Ahuachapán, alt. 800 m., *Standley* 19811.

8. **Hampea stipitata** S. Wats. Proc. Amer. Acad. **21**: 460. 1886.

The following specimens have been examined:

GUATEMALA: Chocón Plantation, a large tree, March 20, 1885, *Watson* 31 (type; Gray Hb.). Quiriguá, *Standley* 24600. Finca Sepacuité, Alta Verapaz, *Cook & Griggs* 576, in part.

HONDURAS: Near Puerto Sierra, *Wilson* 62. Near Cuyamel, *Record & Kuylen* 17. San Pedro Sula, *Thieme* 5603.

Known in Honduras as "majao colorado."

9. **Hampea trilobata** Standl. Contr. U. S. Nat. Herb. **23**: 787. 1923.

Specimens have been examined, as follows:

CAMPECHE: Apazote, Dec. 27, 1900, *Goldman* 488 (type).

YUCATAN: Izamal, *Gaumer* 845. Cotilcim, *Gaumer* 23386. Without locality, *Gaumer* 24260.

BRITISH HONDURAS: Without locality, *Record* in 1926; *Winzerling* V.18.

Known in British Honduras as "moho." The Maya name used in Yucatán is given as "toobhoob."

ZOOLOGY.—*Note on the occurrence of the Six-Lined Race-Runner in the District of Columbia.*[1] C. S. EAST, U. S. National Museum. (Communicated by A. WETMORE.)

A specimen of the Six-Lined Race-Runner, *Cnemidophorus sexlineatus* (Linn.) was collected June 10, 1927, at Terra Cotta, within the District of Columbia, by Mr. August Busck of the Bureau of Entomology. Numerous other individuals of this lizard were observed at this place. So far as is known this is the first specimen of the species taken in the District. The nearest locality hitherto recorded is the junction of the Defence and Crain Highways, Prince George's county, Md., a distance of about 20 miles, where Mr. M. K. Brady recently took three specimens. Previous to this the nearest records were from Chesapeake Beach, Calvert County, Md. Dr. W. P. Hay in *A List of the Batrachians and Reptiles of the District of Columbia and Vicinity* (Proc. Biol. Soc. Washington **15**: 134. 1902) says: "As to the occurrence of this species within our limits there is some doubt, but it has been taken at no great distance both north and south so it will doubtless be found here sooner or later." The specimen collected by Mr. Busck has been placed in the collection of the United States National Museum (U. S. N. M. 72592).

PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

PHILOSOPHICAL SOCIETY

954TH MEETING

The 954th meeting was held at the Cosmos Club March 19, 1927. The program of the evening was given in commemoration of the 200th anniversary of the death of Sir Isaac Newton.

Program: FREDERICK E. BRASCH, *Life of Sir Isaac Newton, and his contemporaries.*

EDGAR W. WOOLARD, *The place of Sir Isaac Newton in the history of pure mathematics.* The great reputation of Sir Isaac Newton as a pure mathematician rests chiefly, though not exclusively, on the fact that he was one of the founders of the Infinitestimal Calculus, to the invention of which the greater part of the mathematics and physics of today owes its existence. The development of the concepts which Newton employed in constructing the Calculus may be traced back directly to the ancient Greeks; by the time of Newton a crude process of integration was in common use, and considerable approach had been made to differentiation but all his predecessors missed the *analytical method* which he devised—there was no differential or integral *calculus*, properly so called.

[1] Received August 1, 1927.

While the practical advantages of Newton's methods far exceeded those of all previous results, nevertheless the methods of the ancient Greeks were considerably superior in respect to soundness of theory. Newton's work is an interesting example of the way in which, even in mathematics, a correct intuition may appear and lead to a great wealth of new knowledge long before a logical proof of its correctness can be supplied, or even before the intuition itself can be correctly formulated. Neither Newton nor his contemporaries ever succeeded in placing the calculus on a satisfactory foundation; the rules appeared to give correct results, but it was not known why they did; all of Newton's expositions of his calculus were vague, and encumbered with difficulties; the validity of the calculus was more than once questioned, often with good reason. Newton originally based his calculus on infinitestimals, using these to obtain his co-called fluxions; he later altered the foundations several times; he never used the method of limits to construct the calculus.

During the period immediately following Newton, mathematicians, with great skill, exploited the wonderful powers of the new calculus, and extensively developed the purely *formal* part, but gave little attention to the foundations of the subject. The serious difficulties in which they, as a result, became involved led to a period of *critical* work during which modern standards of rigor came into existence. Subsequent work in pure mathematics has consisted of building up the superstructure to greater and greater heights, while tying its parts together more and more firmly by severer standards of rigor, and basing the whole on ever deeper and stronger foundations, until at the present time the great structure of modern pure mathematics, while not perfect, is nevertheless the securest structure known to human thought. (*Author's abstract.*)

T. B. BROWN, *The contribution of Newton to optics.*

PAUL R. HEYL, *The contribution of Newton to mechanics and astronomy.* Newton was a good deal of a general practitioner in science, as were all of the scientific men of his day. His work in optics and in mathematics was important but not more so than that of a dozen others. Why, then, is his name preeminently remembered. If we look for the reason in his contributions to mechanics and astronomy as set forth in the Principia, we find that most of the facts therein stated were not original with Newton.

His preeminence lay in his breadth of vision. He correlated the disjointed facts of his day which had been discovered by others and his bequest to his successors is a permanent economy of thought and a new point of view. (*Author's abstract.*)

955TH MEETING

The 955th meeting was held at the Cosmos Club April 2, 1927.

President AULT announced the death of Dr. WILLIAM H. DALL who was the last surviving founder of the Society.

The address of the evening was given by Dr. W. H. HOBBS of the University of Michigan on *The first Greenland expedition of the University of Michigan.* The University of Michigan expeditions to Greenland have had as their primary object a study of the air circulation over the vast ice-cap (continental glacier) which covers all but a narrow marginal fringe of the continent. We have chosen to make our base within the Holstenborg district of southwest Greenland, where the land ribbon is widest, and this chiefly for two reasons. It was believed that, first, the margin of the inland-ice though here more distant from the coast would be found to afford a less steep marginal surface and

hence give an easier route to the interior; and, second, the crossing of the land area where broadest would afford an opportunity to ascertain whether there had been more than a single advance and retreat of the ice-front.

In both these expectations we have not been disappointed. A feasible route to the interior of the ice-cap has been found, and it has been learned that a second advance and retreat of the ice-front has procured a hinterland characterized by subdued topography lying behind the much higher and more rugged topography of the coastal zone.

Pilot balloon ascensions have been regularly carried out under the direction of Mr. S. P. Fergusson, our aerologist, whose services were furnished us by the U. S. Weather Bureau for the season of 1926; and an ice-cap party sent up pilot balloons over the ice-cap itself, the first ascensions of this kind to be made either in the Arctic or Antarctic.

The first sounding balloons to be sent up in Greenland reached in one case an altitude of 5500 meters and the meteorograph was recovered with record intact. These ascents were made possible by use of the new Rossby deflating device.

Studies of the effect of a simple fracture system within the rocks introducing a very striking "checker-board" type of relief are being made by Mr. Ralph L. Belknap, the geodosist and geologist of the expedition who is to return to Greenland the present year. A study of the raised beaches has been carried out by Dr. Laurence M. Gould, assistant director of the 1926 Expedition.

It had been expected to advance in 1926 a considerable distance over the inland-ice toward the interior, but after its margin had been reached by four of the party with four Greenlanders, the failure to find game, which had once been abundant in the region, compelled a return on reduced rations and by forced marches after only four days had been spent at the ice-cap. This attack upon the ice-cap is to be carried out during the present season.

Professor James E. Church, Jr., authority on snow surveys and director of the Mount Rose Observatory, is to occupy a mountain station near the margin of the ice-cap and carry out meteorological observations throughout the year from the summer of 1927 to that of 1928. He will have as his companion Mr. P. C. Oscanyan, Jr., wireless expert, both having been members of the 1926 Expedition. In this mountain station they will be exposed to the full force of the blizzard winds which blow outward in strophs from the interior of the ice-cap.

In cooperation with the Michigan Greenland expedition of 1927–28, Dr. Constantin Dumbrava, Director of the Roumanian Greenland expedition, will establish his base near Angmagssali on the border of the ice-cap in southeast Greenland and in about the same latitude. He will also occupy a mountain station and make observations according to the same plan. Cooperative ascents by pilot balloons will be made at both these stations and also at two stations in Iceland by Drs. Georgi of the Deutsche Seewarte of Hamburg, Germany, and Thorkel Thorkelssen of Iceland.

During the present season also the attempt will be made to take soundings of the ice-cap by the echo methods now in use in connection with petroleum surveys. (*Author's abstract.*)

ENTOMOLOGICAL SOCIETY

388TH MEETING

The 388th regular meeting was held December 2, 1926, in Room 43 of the National Museum, with President J. M. ALDRICH, in the chair and 26 members and 19 visitors present.

J. A. HYSLOP read the following notice of the death of Dr. Henry Skinner of Philadelphia: The Entomological Society of Washington receives with sorrow and a feeling of serious loss the notice of the death on May 29, 1926, of Dr. Henry Skinner, at one time a corresponding member of this Society. Dr. Skinner, one of the most widely known North American entomologists, was the Conservator of Insects in the Academy of Natural Sciences, Philadelphia. He was for many years the editor of Entomological News, and a member of the International Commission on Zoological Nomenclature. His special entomological interest was in the Lepidoptera, to the literature of which group he made many valuable contributions. In the later years of his life he devoted himself almost exclusively to the Hesperiidae.

Mr. ROHWER presented an invitation from the Carnegie Institution to the members of the Society to attend an exhibition on December 11, 12 and 13, illustrating the advances made in scientific methods, and accomplishments in the line of research by the Carnegie Institution.

Program: Dr. E. A. RICHMOND: *Olfactory response of the Japanese beetle.* The paper was illustrated with lantern slides showing various kinds of traps. The greatest activity of the beetles is between 10 A. M. and 4 P. M. The females numbered about one-third more than males.

Discussion by Messrs. HOWARD, ALDRICH, RICHARDSON, BARBER, MCINDOO, GRAF and WHITE.

Mr. S. E. CRUMB: *General observations on chemotropism in insects.*

Discussion by Messrs. MCINDOO, RICHARDSON, BAKER, GRAF and SIMMONS.

Election of officers for 1927: President, J. A. HYSLOP; 1st Vice-president, J. E. GRAF; 2nd Vice-president, A. C. BAKER; Editor, W. R. WALTON; Recording Secretary, JOE. S. WADE; Corresponding-Secretary and Treasurer, S. A. ROHWER. Executive Committee, A. N. CAUDELL, T. E. SNYDER, and C. T. GREENE. Nominee from the Society for Vice-President of the Washington Academy of Sciences, A. G. BÖVING.

CHAS. T. GREENE, *Recording Secretary.*

389TH MEETING

The 389th regular meeting was held January 6, 1927, in Room 43 of the U. S. National Museum. President J. A. HYSLOP presided. There were present 28 members and 17 visitors.

H. W. ALLEN, Riverton, N. J.; L. M. SCOTT, Washington, D. C., and A. A. GRANOVSKY, Madison, Wisconsin, were elected to membership.

Dr. HOWARD announced that he had attended that afternoon the funeral of Mr. John D. Patten, for a number of years a member of the Society and also for some years its Treasurer. He spoke especially of Mr. Patten's hospitality to the Society and his great interest in its work. Mr. Patten's interest seemed to be more in the members of the Society than in the subject, not being an entomologist himself. A committee composed of Messrs. HOWARD, CAUDELL, and ROHWER was appointed to present resolutions on Mr. Patten's death.

Program: Dr. J. M. ALDRICH, retiring address: *Limitations of taxonomy.* The speaker discussed a considerable number of physical and psychological limitations, which led him to believe that the ultimate classification of insects is very much farther in the future than commonly believed, even by the taxonomists. The address will be published in full in Science.

Discussed by Messrs. HOWARD, ROHWER, and MORRISON.

Dr. J. M. SWAINE, Ottawa, Canada, conveyed greetings from the Entomological Society of Ontario to the Entomological Society of Washington, and expressed his pleasure at opportunity for studying in the U. S. National Museum, especially in the Casey and other special collections. He spoke briefly of some of his recent field work from Cape Breton to British Columbia, and of a trip on the Pacific Coast and in the Mohave Desert.

Mr. RALPH HOPPING, of Vernon, B. C., outlined briefly some of his recent work in British Columbia in control of fruit insects, discussed some noteworthy insect outbreaks, and recorded the collection by him of 173 cutworms around a marigold bush.

Mr. R. E. CAMPBELL, of Alhambra, California, reported on a field trip through parts of Southern California, on which trip he collected a number of rare Bostrichids, *Dinapate wrighti* Horn, from palm trees, on which he later caused the market price to drop from $20 to $5 and less per pair.

Discussed by Messrs. HYSLOP, CURRIE, and SIMMONS.

Prof. W. P. FLINT, of Urbana, Illinois, conveyed greetings from the Illinois entomologists to our Society and expressed his pleasure at being with us.

Prof. J. S. HOUSER, of Wooster, Ohio, discussed the address of the President and added another chapter to his famous so-called "fishworm story," in which angleworms had been reported by him as attacking onions. He narrated another instance of injury by them, this time to pansies.

Prof. JOHN J. DAVIS, of Lafayette, Indiana, gave some reminiscences of meetings of the Society years ago at Sängerbund Hall. He discussed some of the Indiana work by himself and Mr. Cleveland on the effects of flies on dairy cattle in relation to milk production. They found that spraying the animals notably increased milk flow.

Mr. L. M. PEAIRS, Morgantown, West Virginia, discussed insect conditions in his State and gave reminiscences of attendance at former meetings of the Society.

Mr. A. A. GRANOVSKY, Madison, Wisconsin, referred briefly to recent work by that State in airplane dusting of hemlock forests and to researches conducted by the Experiment Station on the relation of certain leaf-hoppers to alfalfa yellows.

Mr. PEREZ SIMMONS presented a brief paper on the ability of the larva of the cheese skipper, *Piophila casei* Linn., to endure unfavorable conditions. The unusual hardihood of the maggots of the cheese skipper is shown by their ability to withstand starvation, low temperatures, high temperatures, and immersion in many liquids which would be promptly fatal to most insects. The usual duration of larval life in hot weather is five or six days, but when proper food is lacking the larval stage may last for as many months. Maggots were found to live in a temperature of 45° to 50°F. for a maximum of seven months. They withstood 32°F. for three months. Half-grown larvae lived for 64½ hours at 5°F. A Russian writer reports that larvae lived two weeks in a temperature of −7°F. Some larvae recovered after exposure to 122° to 124°F. for four hours. They survived about two minutes when immersed in water at a temperature of 129°F. Several European workers have conducted experiments with liquids, such as 95 per cent alcohol, ether, formalde-

hyde, turpentine, petroleum, carbon disulphide, and xylol, and maggots proved to be surprisingly resistant to immersion in these reagents. Maggots buried by the speaker in Pyrethrum powder pupated in it, and others pupated after immersion for 3¼ hours in gasoline. Although other insects are reported to be more resistant to starvation and to high and low temperatures, the all-round hardihood of the cheese skipper larvae appears to be without parallel. (*Author's abstract.*)

Discussed by Dr. ALDRICH, and by Dr. HOWARD, who narrated a story from Reade's "Cloister and the Hearth."

390TH MEETING

The 390th regular meeting was held February 8, 1927, in Room 43 of the U. S. National Museum. President J. A. HYSLOP presided. There were present 30 members and 16 visitors.

The Secretary-Treasurer reported briefly on a meeting on January 17 of the Executive Committee and read a letter recently received from Dr. Geza Horwath thanking the Society for the friendly greetings sent him in celebration of his 80th birthday. He also read a letter from the Honorary President, Dr. E. A. SCHWARZ, in which Dr. SCHWARZ formally presented to S. A. ROHWER as Corresponding Secretary of our Society his library of books and pamphlets. After remarks by Dr. HOWARD it was ordered by the Society that suitable resolutions of thanks be transmitted to Dr. SCHWARZ. Not only the gift but the thoughtfulness and affection which prompted it are deeply appreciated by the Society.

The principal feature of the program was a symposium on arsenical spray residue, conducted under the direction of Dr. A. L. QUAINTANCE, who gave a brief historical résumé of the progress of work with arsenicals since about 1860. He called special attention to arsenate of lead, which was developed in 1892 by Prof. Moulton as a treatment for shade and other trees in connection with the control of the gipsy moth in Massachusetts. This arsenical was much the best of any available for use on such deciduous fruits as apples and pears by reason of its quality of sticking to fruit and foliage and its harmlessness to the plants. In consequence arsenate of lead has become the main dependence of orchardists for the control of such serious pests as the codling moth and plum curculio. In some regions the codling moth especially is excessively destructive and growers have been given to excessive spraying with arsenate of lead, sometimes so late in the season that a considerable amount of arsenate of lead spray residue might be present on the marketed fruit. This condition gradually grew worse and necessitated a decided change in spray practice and the development of methods to remove spray residues on fruit before marketing. Not only is arsenic in excessive quantities objectionable, but lead also, an accumulative poison, is considered by pharmacologists and others to be equally or more dangerous. The speaker therefore felt that considerable experimental work should at once be undertaken to determine other arsenicals than arsenate of lead, and other stomach poisons than arsenicals for the use of orchardists and vegetable growers. He explained that a large cooperative program of experimental work was being developed between the Bureau and a number of the Entomologists of the State Agricultural Experiment Stations. While the situation at present was considered critical, the speaker had no doubt of the timely working out of the problem.

Dr. P. B. DUNBAR, Assistant Chief, Bureau of Chemistry, discussed the

problem from the viewpoint of the health of the fruit consumer and fruit grower, not that of a physician. He outlined recent work with various lead arsenate sprays with especial reference to toxic effects, and discussed the cumulative effects of lead stored in the human system in chronic poisoning; also certain economic phases of the problem, including possible foreign embargoes from certain European countries. Consideration also was given to restrictions as to the time of application of sprays in relation to harvesting crops; studies of methods by which fruit could be cleaned after harvesting; the possible use of hydrochloric acid in removing lead-arsenate from apples and pears, and the use commercially of cleaning machinery. At a meeting at Salt Lake City, Utah, after the middle of February the whole situation will be reviewed, including discussion of damages from ill-timed spraying and the use of acid-dipping methods. He considered the outlook as a whole to be quite promising.

Dr. B. A. PORTER discussed the plans which have been outlined for a comprehensive reexamination and intensive study of the codling moth problem. While it might seem that this problem had been worked threadbare, phases were pointed out where the surface had been not more than scratched, and many others where more intensive study will undoubtedly add further information of value.

Mr. W. H. WHITE called attention to the arsenical residue problem as it affected the control of certain truck crop pests, and directed particular attention to the arsenical residue on celery as a result of attempting to control the celery leaf-tyer (*Phlyctaenia rubigalis*) at Sanford, Fla., by treating with arsenicals. A brief summary of the results of a cooperative project to determine the arsenical residue of celery treated with calcium arsenate both in the form of a spray and a dust was presented. This work indicated that if effective arsenical treatments were applied it would be necessary to wash the treated product to avoid dangerous amounts of arsenic reaching the consumer. Sodium fluosilicate, which had been suggested as a substitute for arsenicals, was being tested as a control for the celery leaf-tyer, and the indications were that this chemical shows promise as a remedy. It was believed that this material, although possibly not as dangerous as the arsenicals to the consumer, was harmful, and in all probability it would be necessary to wash celery treated with it before marketing.

Dr. SIEGLER gave a brief review of experiments in mechanical control now being conducted at the Sligo, Md. laboratory, including chemical treatment of bands with various substances, the use of corrugated paper vs. burlap bands. He considered the chemical treatments most promising.

Dr. CHARLES H. RICHARDSON stated that the laboratory work on the arsenical problem at Washington will consist of the study and preparation of toxic compounds by the Bureau of Chemistry and the determination of their insecticidal value by the Bureau of Entomology. This work naturally divides itself into two parts: An investigation of the toxicity of the arsenic compounds and an investigation of other non-arsenical compounds. The investigation of arsenical compounds will extend beyond the present emergency to a thorough study of arsenic compounds that might be used on non-edible crops or in baits where there is no danger of effect upon human health. It offers an opportunity to study more intimately such complexes as the arsenates of iron, aluminum and copper and to investigate the feasibility of using some form of arsenic absorbed on colloidal substances. Special effort will be directed toward the discovery of a substitute for acid lead arsenate because

of the prejudice against lead. The study of non-arsenical compounds will probably first resolve itself into an examination of the fluosilicates and fluorides, as these seem now to be the most promising substitutes for the arsenicals. In addition, other groups of inorganic and organic compounds which are thought to have possibilities will be studied. Particular attention will be given to methods of comparing the toxicity of compounds which are to be used as stomach poisons. It is hoped to formulate methods by which insects may be dosed with known quantities of a compound per unit of body weight under controlled temperature and humidity. Attempts will also be made to study tolerance to stomach poisons, and the absorption, storage and elimination of toxic substances by insects.

Dr. McINDOO stressed the undesirability of giving too much publicity to the entire situation.

Mr. WOOD discussed methods of application of calcium cyanide in dusting, including comparison of present work with work on chinch bugs in windy weather.

Prof. CORY also directed attention to the bad impression conveyed by too much publicity given to the problem. He also discussed control of Spanish leaf-miner on beets by the use of barium carbonate as reported by a Russian worker and noticed in the Review of Applied Entomology.

Mr. ABOTT briefly referred to the use of barium carbonate and other chemicals as stomach poisons.

Mr. BARBER, at the request of Dr. Frank E. Blaisdell of San Francisco, California, presented a brief paper concerning an unidentified black beetle excavated from the ruins of an Egyptian city dated between 117 and 235 A. D.

Mr. GAHAN reported that the Motschulsky types of certain Hymenoptera within the genus *Harmolita* recently had been received by Waterton at the British Museum.

Mr. ROHWER, commenting on Mr. Gahan's note, stated that certain Motschulsky types of beetles had been received by Dr. Arrow at the British Museum. Dr. Arrow's study of these types established the fact that the species found in the eastern part of the United States and previously considered to be *Serica japonica* Mots. should be called *Aserica castenea* Arrow.

Dr. ALDRICH reported on a shipment of Muscoid flies from the Museum in Vienna sent to him for study, in which were found a number of old specimens which Dr. Riley had Dr. Coquillett send to Europe many years ago.

J. S. WADE, *Recording Secretary*

391ST MEETING

The 391st regular meeting was held March 3, 1927, in Room 43 of the U. S. National Museum. President J. A. HYSLOP presided. There were present 18 members and 12 visitors.

On invitation of the president, Dr. STANISLAW MINKIEWICZ, of the Institute for Agricultural Research, Department of Entomology, Pulaway, Poland, made a brief address expressing his pleasure at being able to attend a meeting of our Society and conveying greetings from the entomological fraternity of his country. He is studying in this country under the auspices of the Rockefeller Foundation, and his itinerary covers travel from Nova Scotia to the Pacific Coast. He will remain in America eight or nine months.

Remarks also were made on invitation by Mr. A. F. BURGESS, of the Gypsy Moth Laboratory at Melrose Highlands, Massachusetts. He gave a brief resume of the previous summer's work on his problem, with especial reference

to airplane dusting in forest areas. He is much encouraged over the results of the additional season's work along this line, as he feels that methods have been more effectively developed toward practical control. He also discussed a recent report from Mr. Muesenbeck containing data and showing photographs of somewhat comparable work in Germany. Mr. BURGESS stressed the practical value of having our own men become acquainted with work of this kind in foreign lands, as important and valuable information may thus be secured.

Program: Dr. C. A. WEIGEL: *Hot-water bulb sterilizers.* The present restriction governing the entry of Narcissus bulbs from foreign countries requires that all such imported bulbs shall be given the hot-water treatment either at the port of entry or other designated place. This treatment involves the submersion of bulbs in wire baskets or other containers in water ranging in temperature from 110 to 111°F. for a period of not less than 2½ hours. The object of this restriction is to prevent not only the further entry into this country of the three important bulb pests, the Narcissus fly, *Merodon equestris* Fab., the lesser bulb fly, *Eumerus strigatus* Fallen, and the bulb eelworm, *Tylenchus dipsaci* Kuhn, against which the hot-water treatment is supposed to be effective, but also their further dissemination throughout the United States. The author discussed the various types of hot-water sterilizers which have been constructed in this and other countries, giving special attention to the underlying principles involved in the construction of such apparatus, particularly the methods employed in maintaining a constant and uniform temperature of the water throughout the period of treatment.

Discussed by HYSLOP, BURGESS, and HOWARD.

A paper containing a review of the pea aphis problem was presented by W. H. WHITE. A historical account was given of the pea aphis outbreaks and their effect on the pea canning and seed industries. Measures which had been taken to combat the pest were discussed. The paper was supplemented by lantern slides, illustrating various control devices. Discussed by BURGESS, WEIGEL, HOWARD, SIMMONS, HYSLOP, and SNODGRASS.

Dr. HOWARD discussed briefly the phenomenon of phoresy apropos of a recently published paper by Ch. Ferriere.

Mr. ROHWER reported the recent receipt from Mr. Bishopp of a Chalcid parasite of screw-worm flies which was studied several years ago and thought to be new species. The present material was referred to Mr. Gahan, who determined it as *Brachymeria fonscolombei* (Dunfoar). The American and European species were found to be the same, and it is fairly common in Europe. He discussed the distribution of some of our parasites, notably those within the genus *Apanteles*, and stressed the need for more study of world-wide material rather than that from a single country.

Mr. HYSLOP reported the receipt recently from Dr. Van Dyke in California of larvae which proved to be those of a typical *Cebrio*. Hitherto, the Cebrionidae have been supposed to occur only east of the Rocky Mountains and the Plastoceridae only west of the mountains.

Dr. HOWARD spoke of the discovery some years ago by Dr. Hooker and Mr. Wood of two Hymenopterous parasites of ticks in Texas for which he founded the genus *Ixodiphagus*, and of the subsequent finding of a European species of this same genus in ticks on deer near Paris, France. He said that the European species had recently been brought to this country and established on the Island of Naushon near Boston and that Dr. Cooley is trying to take the same European parasite to the Bitter Root Valley in Montana in the hope that it will parasitize the Rocky Mountain spotted-fever tick.

Mr. BARBER, commenting on Mr. Rohwer's remarks gave several examples of the extreme desirability of having more studies of insects from a world-wide viewpoint, and pointing out a number of cases of synonomy which would not have occurred had not the studies been made on a comparatively provincial basis.

J. S. WADE, *Recording Secretary.*

SCIENTIFIC NOTES AND NEWS

In the U. S. Geological Survey the Section of Areal Geology has been combined with the Section of the Geology of Nonmetalliferous Deposits, with G. R. MANSFIELD as Geologist in charge. H. D. MISER has been placed in charge of the Section of the Geology of Fuels.

The Italian Government has nominated Dr. HENRY S. WASHINGTON, of the Geophysical Laboratory, Cavaliere of the Order of the Crown of Italy and has decorated him with the Cross of the Order, in recognition of his work on the rocks and volcanoes of Italy.

Dr. A. F. FOERSTE, who for some months has been studying certain groups of Paleozoic cephalopods at the National Museum, has returned to his regular duties as teacher of physics in Steele High School, Dayton, Ohio.

A. S. HITCHCOCK has spent about three months in Washington, Oregon, and northern California, studying the grass flora. Much of the work has been carried on in the National Forests in company with members of the Forest Service investigating range problems.